

# Land Product Validation (LPV) Sub-group Meeting



Fernando Camacho – (EOLab/U. Valencia) – Chair  
Vice Chair – Vacant  
Subgroup meeting  
09 Jul 2019

**NEXT LPV TELECON 10 Sep 2019**

# Attendance

## Participants

Fernando Camacho  
Jaime Nickeson  
Zhuosen Wang  
Tomoaki Miura  
Sylvain Leblanc  
Carsten Montzka  
Michael Cosh  
Joshua Gray  
Glynn Hulley  
Frank Götsche  
Laura Duncanson  
Sophie Bontemps  
Thomas Nagler

## Excused

Marie Weiss  
Else Swinnen  
Dominique Carrer  
Hongliang Fang  
Gareth Roberts  
Pontus Olofsson  
Jadu Dash  
Ian Grant

## Absent

Andrew Edwards  
Luigi Boschetti  
John Armston  
Mat Disney

# Agenda items

- Welcome
- Status of Working Group
- LPV Action Plan (2019-2022)
- WGCV Meeting next week in Perth
- New Meetings page on LPV web site
- Web Site and Listserv review and update
- Focus Area Reporting

# Status of Working Group

Again, **we need your assistance** to help us find candidates!!!

**Please** volunteer if you are interested in Vice Chair position (a Non-European). Ask around to help us find candidates!!! You have the best access to the validation community. We can provide position details (also included in last telecon notes).

Have remaining vacancies in our LPV working group

- Need a volunteer to help with **Snow**
- And a co-lead in Biophysical focus area to work with Marie on **Fapar**

Very pleased to report that **Victor Rodríguez Galiano** new LPS co-lead in replacement of Jadu Dash. Welcome to LPV team Victor!

# LPV Action Plan (Q2 2019- Q1 2022)

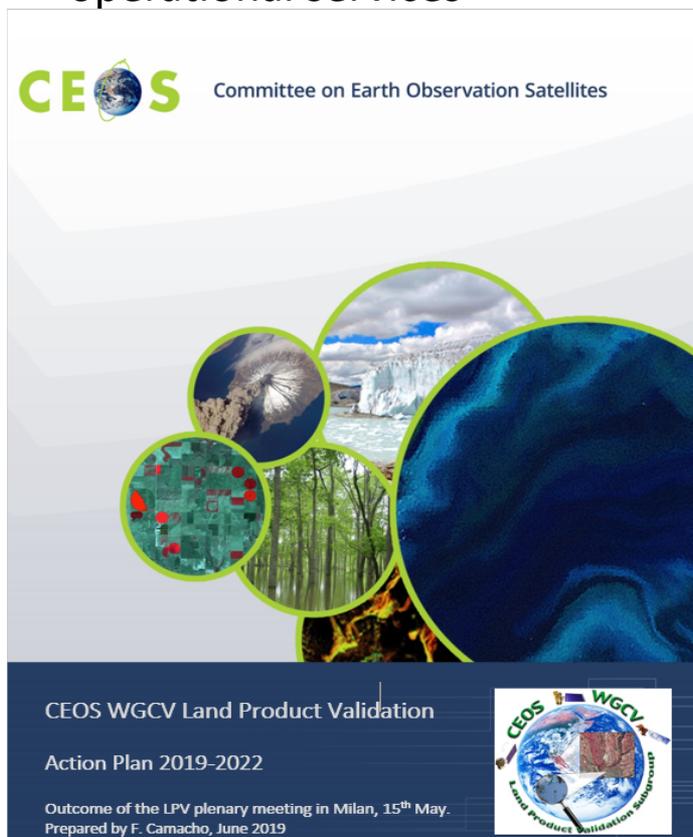
## LPV Strategy for this period based on 4 components:

1. Continuous Development of Good Practices for global satellite land product validation
2. Improving ground references to achieve higher validation stage by improving uncertainty characterization and spatio/temporal coverage
3. Promote validation and inter-comparison exercises with CEOS agencies and operational services

4. Improve LPV communication with stakeholders

## Outcome: 28 Actions

1. CEOS WP 2019-2022 (CARB-16, AGRI-13): 4 actions
2. Good practices protocols writing : 8 actions
3. Supersites and in-situ references: 4 actions
4. New Inter-comparison exercises: 2 Actions – BRIX-2, SR round-robin (TBD)
5. Validation and inter-comparison of satellite products: 3 actions (Albedo and VIs)
6. Outreach and communication: 7 Actions (3 workshops: Biophysical, VIS, LC)



# LPV Recommendations

- **LPV R-2019-1:** Promote FRMVeg protocols under CEOS WGCV, to involve other agencies to get the needed international consensus on the surface reflectance and FAPAR validation
- **LPV R-2019-2:** Adopt Fiducial Reference Measurement concept in the CEOS LPV and modify the validation hierarchy table accordingly
- **LPV R-2019-3:** Endorse carbon supersites as CEOS WGCV cal/val sites (contribution to CARB-16).
- **LPV R-2019-4:** Collaborate with IVOS, propose a new CEOS WGCV surface reflectance validation and intercomparison exercise lead by ESA and NPL (UK) in the framework of FRM4Veg.
- (Additional) **LPV R-2019-5:** That the Copernicus Land Monitoring Service perform an independent quality assessment of GBOV procedures and database. The LPV community stresses that this evaluation is mandatory to qualify the GBOV database as CEOS reference datasets for validation activities. The LPV focus area experts propose to act as external evaluators in this independent review process.

# Proposed new IVOS-LPV SR Task

**Round-Robin inter-comparison exercise of field Surface Reflectance ,and development of community endorsed FRM protocols for SR**

- **Lead Agency:** ESA (FRM4Veg project), funding support (ESA FRM4Veg Phase 2)
- **IVOS** supporting calibration/traceability of field radiometry...
- Agree on fiducial reference measurement protocols with full traceability for surface reflectance (SR) characterization of natural targets
- Agree on protocols for SR validation (field radiometry, airborne, models)
- Perform Round-Robin intercomparison of SR, to learn and refine FRM protocols
- Organize two workshops before and after RR for discussion on methods and outcomes

**Outcome:** Endorsed FRM4Veg SR protocols under CEOS WGCV (LPV-IVOS)

**Period:** 2020 - 2021 (RR exercise in June-July 2020, Europe)

**On the horizon:** Validation of SR products using community endorsed protocols

# WGCV Meeting next week in Perth

WGCV-45 will be held next week in Perth (CSIRO). There will be three LPV presentations:

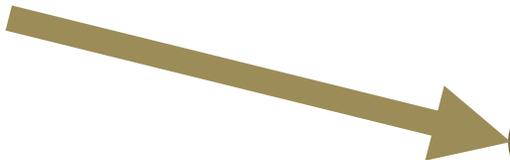
- LPV subgroup report
- LPV contribution to Carbon strategy (Biomass activities)
- Proposition for a new SR task

And a side meeting with incoming SIT team on Biomass workshop, 19 July in Perth.

Any last minute comment you want to report, please send me by email this week!

# New LPV Meetings Page

New LPV Meetings navigation added on the left. Click and it opens a list of available meeting content posted. The last two plenaries are there, as well as the recent VI meeting. If you have past or future LPV meetings, presentations can be hosted here



**CEOS Working Group on Calibration & Validation**

**Land Product Validation**

HOME ABOUT DOCUMENTS

**LPV Focus Areas**

- LAI
- fAPAR
- Fire/Burn Area
- Phenology
- Vegetation Index
- Land Cover
- Snow Cover
- BRDF/Albedo
- Soil Moisture
- LST and Emissivity
- Biomass

**LPV Supersites**

**LPV Meetings**

- LPV Plenary 2018
- LPV VI Focus Area 2018
- LPV Plenary 2019

**LPV-Organized Meetings**

The LPV Working Group, which is comprised of leads, tries to convene for a day annually if possible. These are all opportunistic large gatherings of EO scientists.

**LPV Plenary Meeting, Frascati/ESRIN,**

This LPV Plenary was convened at ESA/ workshop held at the same location earlier

**LPV NDVI Focus Area Meeting, Washij**

The NDVI focus area meeting was convened of all the folks who were in town that week

**LPV Plenary Meeting, Milan, Italy - Apr**

Another LPV Plenary was held in Italy by a contingent of the LPV working group that

# Annual Web Site and Listserv Review

- We are well beyond our due date for annual review of the focus area pages.
- Target was for completion by June, we are into July and some focus areas still need review.
- New content is not required, but a review of current content is.
- All focus areas have received spreadsheets of their current community and product lists.
- Please verify information is current! If you know a colleague on your listserv has moved institutions, please update their affiliation. Add colleagues not currently on your list.
- Please help me to get this completed!!

# Update Status

## 2019 Web Site Update Status by Focus Area

Focus Area	Letter sent to leads	Home Page Review / Update	Products Reviewed/ Updated	Collaboration Review/ Update	References Updated	Listserv review/ update	Letters to community
Landcover	Apr 2019						
Biophysical LAI	Apr 2019	May 2019	May 2019	May 2019	May 2019	May 2019	
Biophysical Fpar	Apr 2019						
Surface Rad/Albedo	Apr 2019		June 2019				
LST/Emissivity	Apr 2019	Apr 2019	Apr 2019	Apr 2019	Apr 2019	Apr 2019	
Fire/Burn	Apr 2019		July 2019		July 2019		
Soil Moisture	Apr 2019						
Phenology	Apr 2019						
Snow Cover	Apr 2019						
Vegetation Index	Apr 2019		May 2019		May 2019		

# Focus Area Reports

- Fire/Burn Area
- Phenology
- LST&E
- Surface radiation
- Soil Moisture
- Vegetation Indices
- Snow
- Biomass
- Land Cover
- Biophysical (LAI/FAPAR)

# Fire/Burned Area

# Phenology

- Welcome to LPV team!

New co-chair: Victor Rodríguez Galiano (Universidad de Sevilla)

- Gratitude to Jadu Dash for his leadership
- Compiling website updates
- Phenology validation best practices
  - Continuing work started by Jadu
  - Compiling list of independent datasets
- Best practices document will lead to validation protocol definition
- Phenology-group newsletter by end of summer
- Workshop for 2020

# LST & Emissivity (1/5)

- LST book 'Taking the Temperature of the Earth' published; DOI of LST chapter: 10.1016/B978-0-12-814458-9.00003-4
- 2019 Fall AGU Meeting Session (San Francisco, Dec 2019): 'Taking the temperature of the Earth: uncertainties, trends, and applications across all Earth surface domains'. (session title: GC078; deadline for abstracts: 31 July)

## Looking for submissions related to:

- 1) improving ST product quality through validation
- 2) advances in ST measurement and retrieval
- 3) monitoring and better understanding variability and long-term climate trends
- 4) science applications using ST data

# LST Uncertainty (2/5)

- 2<sup>nd</sup> FIDUCEO workshop 25-27 June 2019 on uncertainty in climate data records
- Consensus on establishing consistent approach for LST uncertainty estimation across sensors and products
- Validation of uncertainties with *in situ* data
- Workshop to be held at JPL in Spring 2020 under umbrella of ILSTE working group

# Landsat Level-2 ARD LST product (3/5)

- U.S. Landsat Analysis Ready Data (ARD) Level-2 products:
  - TOA BT, reflectance, surface reflectance, surface temperature (ST)
  - Validation efforts underway for ST product by JPL, RIT



## SURFRAD site assessment of heterogeneity

Site	Rank	Score	Variogram Range		Variogram Sill		Coefficient of Variation [%]	
			[km]		[K]		%	
			Summer	Winter	Summer	Winter	Summer	Winter
Desert Rock, NV	1	2.67	0.44	0.64	0.81	0.51	0.33	0.26
Fort Peck, MT	2	1.83	1.42	0.96	3.66	1.93	0.31	0.32
Bondville, IL	3	1.34	0.77	0.58	6.74	0.49	0.43	0.15
Penn State, PA	4	1.32	2.02	2.96	6.36	3.45	0.54	0.26
Goodwin Creek, MS	5	0.95	0.78	0.58	7.48	3.29	0.66	0.42
Table Mtn, CO	6	0.83	1.52	1.12	10.69	0.96	0.80	0.41
Sioux Falls, SD	7	0.50	1.57	1.68	12.14	16.82	0.76	1.08



Before the harvest



Bondville

After the harvest

# SURFRAD: Desert Rock, NV (4/5)



Source: Google Earth

Source: NOAA ESRL

# SURFRAD: Sioux Falls, SD (1/5)



# Surface Radiation (1/2)

## Protocol

- Albedo Best practices protocol paper in prep.
- Incoming solar radiation direct/diffuse. Need for a new best practices protocol document.

## Products

- New product: EPS Albedo operational (<https://landsaf.ipma.pt/en/products/albedo/etal/>)
- List of radiation products will be available soon on <https://lpvs.gsfc.nasa.gov/producers2.php?topic=SurfRad>

# Surface Radiation (2/2)

## Meetings Past:

- LPS2019 : 1 presentation (Z. Wang).
- JPGU2019 conference in Chiba (Japan) – [https://confit.atlas.jp/guide/event/jpgu2019/session/MAG38\\_30PM1/detail](https://confit.atlas.jp/guide/event/jpgu2019/session/MAG38_30PM1/detail).
- 2 presentations (D. Carrer): status of albedo products over Europe and recent advances using neural networks.
- *NASA (E. Vermote, JC. Roger) is developing new cameras. The cameras will be installed in an US ground station for validation studies (high resolution radiation products).*

## Next meetings:

- Joint EUMETSAT/AMS/NOAA Conference in Boston – [https://www.eumetsat.int/website/home/News/ConferencesandEvents/DAT\\_4063458.html](https://www.eumetsat.int/website/home/News/ConferencesandEvents/DAT_4063458.html)
- AGU 2019 Session <https://agu.confex.com/agu/fm19/prelim.cgi/Session/786>

# Soil Moisture (1/2)

## SMAP

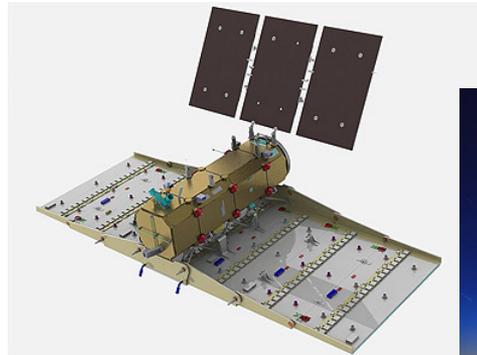
- SMAP memory incident on 6/24/19, repair plan in development, expectation back online in weeks to months.
- SMAPVEX19 postponed to 2020

## NISAR

- The NASA-ISRO Synthetic Aperture Radar mission (~2022) will monitor in L-band via radar at a high resolution (~100m) nominally every 12 days (2 overpasses/12 days).
- Summer 2019 UAVSAR campaign for mimicking NISAR coverage, began June 1, 2019
- L+S ASAR flights

## SAOCOM 1A

- Successful launch Oct 8<sup>th</sup>.
- 1B planned for 2020 launch
- L-band SAR



# Soil Moisture (2/2)

## SARsense

- Successful L-band SAR rehearsal campaign at agricultural area in Germany for the potential ESA Copernicus mission ROSE-L (Radar Observing System for Europe)
- Planned to fly in conjunction with Sentinel-1 (C-band)
- Joint aircraft measurements of C- and L-band SAR together with HyPlant (hyperspectral, SIF -> FLEX) and HyTES (hyperspectral thermal -> LST candidate)

## Other

- U.S. National Soil Moisture Network initiative is gaining steam.
- Alex Gruber draft of SM Error Assessment manuscript
- Good Practices Protocol Writing Assignments made.

## Workshops/Meetings

- 6<sup>th</sup> Satellite Soil Moisture Validation and Application Workshop, Sept 15-17, 2020, Perugia, Italy ([site](#))
- 7<sup>th</sup> Satellite Soil Moisture Validation and Application Workshop, Fall 2022, New Orleans, USA

# Vegetation Indices

- Website revision
- Annual newsletter
- VITO is executing a field campaign at Loncée (an agricultural site in Belgium) during the third week of July to measure LAI, fAPAR and surface reflectance using the Imagines protocol for field campaigns (written mainly by EOLAB).

# Snow (1/3)

## Projects

ESA CCI-Snow

Combined Optical and Passive MW datasets

Validation done with in situ data from ECMWF, etc, and Landsat/Sentinel2

Protocol is based on SNOWPEX

Project started in Oct, first data due this fall

Includes 40yr time series from AVHRR (4KM), and MODIS (1KM), both products providing fractional snow extent.

Sentinel 3 for Science

Looking for new snow parameters, such as snow grain size and snow albedo. Spatially limited. OLCI is the data source, and validation is done with sparse in situ data.

SAR Wet Snow Mapping Project - Sentinel 1 for science

Aim to determine if SAR can be used to detect wet snow in large regional non-mountainous areas.

Planning a continuation of SnowPEX2

Presented at LPS, in discussions with ESA and EUMETSAT

# Snow (2/3)

## Services

- Copernicus GLS Snow Cover for NRT applications, Global 1 km, with the aim to go to 0.5 km next year
- New service from European Env'tal agency, hi res snow cover for Europe at 20m based on S2, validation done with in situ, perhaps incl met cam

# Snow (3/3)

## Missions

### Copernicus Expansion Mission Rose-L

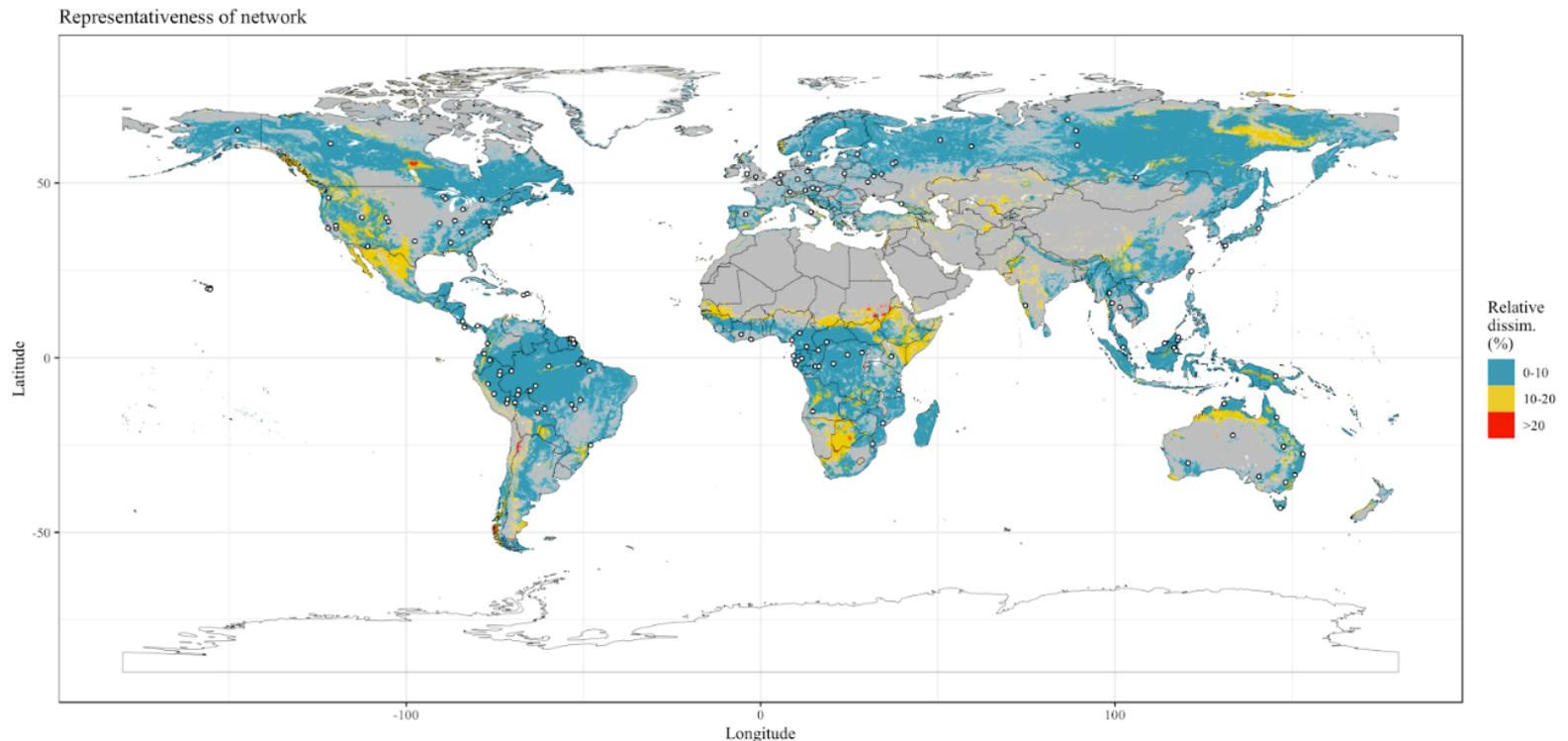
- Planning a field campaign to test the capabilities of retrieving SWE, applying repeat pass L-band data from ALOS-5
- Aim to generate first products of SWE from L-band
- 2 test sites, one in Alps and an arctic site in N. Finland
- ESA negotiating to receive SAOCom data for these regions, but still an open question

### EarthExplorer 10 – Geostationary

- Renamed HydroTerra – C-band sensor
- Can acquire continuously over Europe
- Would apply same technique and Rose-L, but at shorter time stamp

# Above Ground Biomass

- Protocol development / editing ongoing
- Multi-mission group in discussion with ESA/NASA MAAP and CEOS CARD4L about developing definitions of ARD for satellite lidar
- New representativeness analysis of proposed biomass supersites has begun (see below from Nicolas Labriere); aim to have final site list for CEOS endorsement by next month
- BRIX2 activity still being discussed; potentially will be implemented on the ESA/NASA MAAP
- Discussions re: CSIRO/TERN hosting a LPV biomass meeting (Australia 2020)



# Land Cover

- Update of the Land Cover validation protocol
  - Starting with cropland validation (one-class product)  
Already some effort through the JECAM community
  - Generalize to general LC product
  - Deadline: Q4 2020
- GEOGLAM initiative to propose Essential Agriculture Variables (EAVs)

<p>AGRI-13: Iteratively respond to GEOGLAM EO Data Coordination team's definitions of "Applications Ready Data" (ARD+) and "Essential Agricultural Variables for GEOGLAM".</p>	<p>Q4 2019</p>	<p>GEOGLAM will internally lead the development of EAVs and ARD+ based on both biophysical and political requirements. This activity is already underway with a version already under review.</p> <p>Production of these EAVs for GEOGLAM will require a long-term coordinated effort between GEOGLAM and the CEOS Working Group Calibration/Validation's Land Product Validation (LPV) sub-group. It is proposed that in 2019, the mechanisms for such a collaboration are characterized.</p>	<p>GEOGLAM (primary)</p> <p>CEOS Ad Hoc Working Group on GEOGLAM, and WGCV LPV (iterative response)</p>
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- Dedicated workshop in 23-24 October 2019 (Belgium)
- Sophie will liaise between CEOS GEOGLAM initiative and CEOS LPV in response to CEOS WP AGRI-13 action : Stablish mechanism to collaborate with GEOGLAM related to Essential Agriculture Variables (EAVs). EAVs to be produced by CEOS Agencies in GEOGLAM
- Pending: website, newsletter, workshop

# Biophysical (LAI/fAPAR)



- Merging LAI and FAPAR back into a Biophysical focus area is currently underway. New LPV web pages are under review.
- DIRECT 2.0 available on ESA's Cal/Val Portal (140 sites and 242 samples, 2000-2017). Filters forest sites with no understory.
- LAI protocol update: integration of the FAPAR (M. Weiss)
- Special LAI/FAPAR session at IGARSS'19 (<https://igarss2019.org/>)
  - Session MO4.R12. Monday, 29 July, 16:20 – 18:00.
- Validation of LAI/FAPAR over croplands in NE China (H. Fang)
  - Kilometric LAI validation paper to RSE (revised and resubmitted)
  - Decametric resolution LAI data for rice (2012, 2013) and other crops (2016) - <https://doi.pangaea.de/10.1594/PANGAEA.900090>
  - Field LAI and FAPAR measurement ongoing over Honghe rice field, NE China, Jun - Sep, 2019.
- Marie is currently testing the use of an open dataverse that she is building for decametric LAI/fAPAR ground data. More at IGARSS'19.